

SWBAT: Compare sounds using decibels

May 12-8:13 AM

Welcome!!!

SECA Physics
Tuesday 12 May 2015

* Pick up:

- worksheet
- slip of paper (for later)

Need to take test?

Opening Question:

What's a decibel?

TENTH

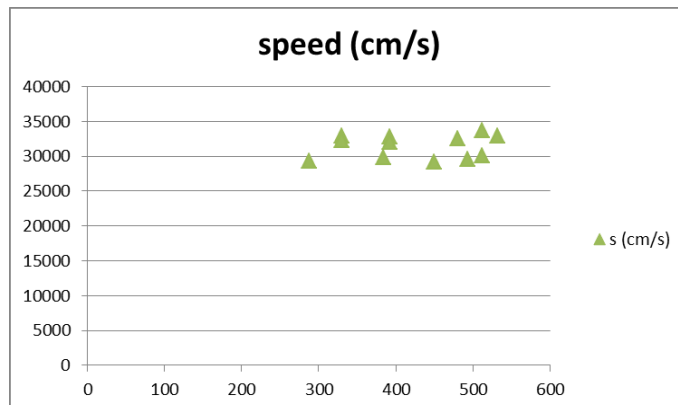
LOUDNESS

Centering



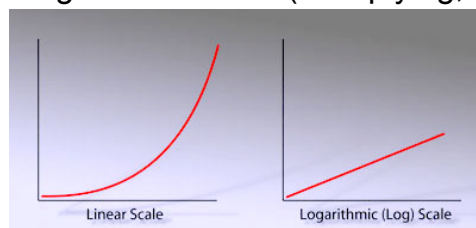
Sep 7-7:04 AM

1. About how many cm/s is the speed of sound in air?
2. To calculate the speed we needed to multiply the wavelength by the _____.
3. Are speeds about the same for different frequencies?



Mar 4-7:36 AM

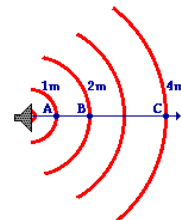
Decibels measure amplitude of sound = loudness = **INTENSITY**
 - It's a logarithmic scale (multiplying, not adding)



- Measures how much power your ear is receiving

Distance
 1 m
 2 m
 3 m
 4 m

Intensity
 160 units
 40 units
 17.8 units
 10 units



- Zero is a reference point: The smallest our ears detect
 => Can have negative dB
THRESHOLD OF HEARING

<http://phet.colorado.edu/en/simulation/wave-interference>

<http://www.acoustics.salford.ac.uk/feschools/waves/wavetypes2.htm#decibel>

<http://www.animations.physics.unsw.edu.au/jw/dB.htm>

<http://www.physicsclassroom.com/Class/sound/u11l2b.cfm>

Feb 27-7:58 AM

$$10^0 = 1$$

$$10^1 = 10$$

$$\rightarrow 10^2 = 10 \times 10 = 100$$

$$10^6 = 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 1,000,000$$

decibel

$$\log 10^1 = 10$$

$$\log 10^2 = 20$$

$$\log 10^6 = 60$$

May 12-8:10 AM

1. A mosquito's buzz is often rated with a decibel rating of 40 dB. Normal conversation is often rated at 60 dB. How many times more intense is normal conversation compared to a mosquito's buzz?

- a. 2 b. 20 c. 100 d. 200 e. 400

$$(60 \text{ dB} - 40 \text{ dB}) = \frac{20 \text{ dB}}{10} = 2 \quad 10^2 = 100$$

① SUBTRACT

② DIVIDE BY 10

③ RAISE $10^{\hat{}}$

$$3 \times 10^2 = 300 \quad 10^3 = 1000$$

$$a. (110 - 100) = 10 \text{ dB} / 10 = 1 \quad 10^1 = 10$$

Source	Intensity	Intensity Level	# of Times Greater Than TOH
Threshold of Hearing (TOH)	$1 \times 10^{-12} \text{ W/m}^2$	0 dB	10^0
Rustling Leaves	$1 \times 10^{-11} \text{ W/m}^2$	10 dB	10^1
Whisper	$1 \times 10^{-10} \text{ W/m}^2$	20 dB	10^2
Normal Conversation	$1 \times 10^{-6} \text{ W/m}^2$	60 dB	10^6
Busy Street Traffic	$1 \times 10^{-5} \text{ W/m}^2$	70 dB	10^7
Vacuum Cleaner	$1 \times 10^{-4} \text{ W/m}^2$	80 dB	10^8
Large Orchestra	$6.3 \times 10^{-3} \text{ W/m}^2$	98 dB	$10^{9.8}$
Walkman at Maximum Level	$1 \times 10^{-2} \text{ W/m}^2$	100 dB	10^{10}
Front Rows of Rock Concert	$1 \times 10^{-1} \text{ W/m}^2$	110 dB	10^{11}
Threshold of Pain	$1 \times 10^1 \text{ W/m}^2$	130 dB	10^{13}
Military Jet Takeoff	$1 \times 10^2 \text{ W/m}^2$	140 dB	10^{14}
Instant Perforation of Eardrum	$1 \times 10^4 \text{ W/m}^2$	160 dB	10^{16}

Mar 4-8:48 AM

Outrageous Acts of Science

A show about viral videos and the science that makes them possible...



"Shredding Speakers" Natural Born Thrillers #4

1. Just watch
2. Read the questions
3. Watch again
4. Discuss
5. Watch a last time to catch anything you might have missed

Oct 4-7:27 AM

Daily 3 Questions

- * Every day except test/project days
- * 3 Questions on the topics of the day
- * Main source of daily points
- * I am happy to give credit when I have no concerns about someone giving or getting help with the answers.

CP: Sound worksheet due
Thursday 5/14

You can't get your points if you don't have your **NAME!!!**

Name	Period
1.	
2.	
3.	

Sep 9-7:32 AM

1. Decibels measure _____ of sound

- a) frequency (pitch)
- b) speed
- c) amplitude (loudness)

2. How many times more power is it if I increase by 20 dB? (EXAMPLE)

$$\frac{20}{10} = 2 \rightarrow 10^2 = \boxed{100}$$

3. Zero decibels (0 dB) means

- a) no vibration / no sound
- b) the quietest we can hear (threshold of hearing)
- c) the loudest we can stand (threshold of pain)

Mar 4-7:36 AM

Mar 6-11:01 AM